APPENDIX

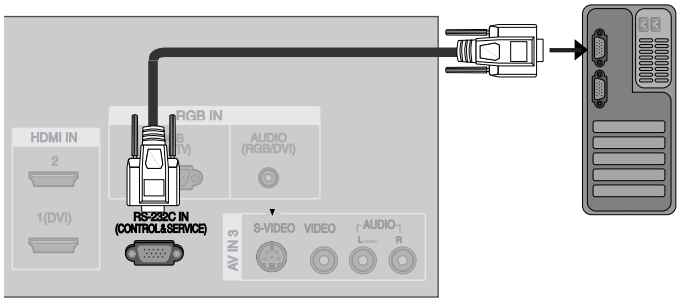
EXTERNAL CONTROL DEVICE SETUP

Connect the RS-232C input jack to an external control device (such as a computer or an A/V control system) and control the TV's functions externally.

Connect the serial port of the control device to the RS-232C jack on the TV back panel.

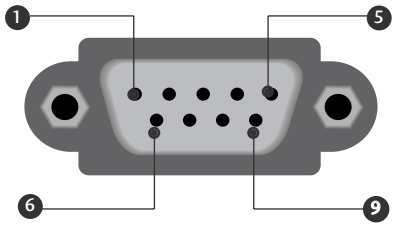
RS-232C connection cables are not supplied with the TV.

RS-232C Setup



Type of Connector; D-Sub 9-Pin Male

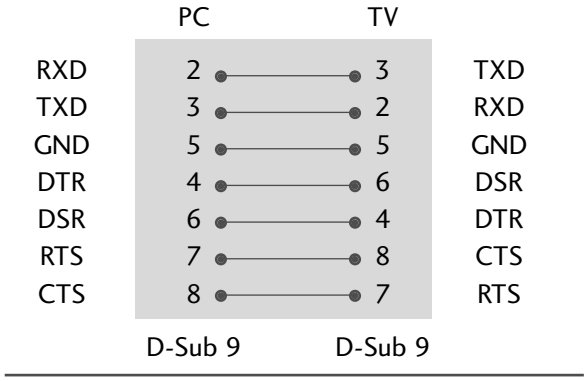
No.	Pin Name
1	No connection
2	RXD (Receive data)
3	TXD (Transmit data)
4	DTR (DTE side ready)
5	GND
6	DSR (DCE side ready)
7	RTS (Ready to send)
8	CTS (Clear to send)
9	No Connection



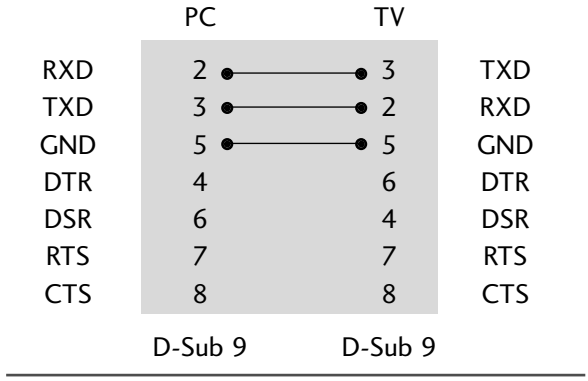
APPENDIX

RS-232C Configurations

7-Wire Configurations (Standard RS-232C cable)



3-Wire Configurations(Not standard)



Set ID

- **Use this function to specify a set ID number.**
- **Refer to 'Real Data Mapping 1'. See page 6.**

1. Press the **MENU** button and then ▲ / ▼ button to select the **SPECIAL** menu.
2. Press the ▶ button and then use ▲ / ▼ button to select **Set ID**.
3. Press the ▶ button and then use ◀ / ▶ button to adjust **Set ID** to choose the desired monitor ID number.
   - The adjustment range of **Set ID** is 1 ~ 99.
4. Press the **EXIT** button to return to normal TV viewing.

Communication Parameters

- Baud rate : 9600 bps (UART)
- Data length : 8 bits
- Parity : None
- Stop bit : 1 bit
- Communication code : ASCII code
- Use a crossed (reverse) cable.

Command Reference List

	COMMAND1	COMMAND2	DATA (Hexadecimal)		COMMAND1	COMMAND2	DATA (Hexadecimal)
01. Power	k	a	0 ~ 1	15. Balance	k	t	0 ~ 64
02. Aspect Ratio	k	c	*	16. Colour Temperature	k	u	0 ~ 3
03. Screen Mute	k	d	0 ~ 1	17. Red Adjustment	k	v	0 ~ 3C(or 50)
04. Volume Mute	k	e	0 ~ 1	18. Green Adjustment	k	w	0 ~ 3C(or 50)
05. Volume Control	k	f	0 ~ 64	19. Blue Adjustment	k	$	0 ~ 3C(or 50)
06. Contrast	k	g	0 ~ 64	20. Abnormal Status	k	z	0 ~ a
07. Brightness	k	h	0 ~ 64	21. ISM Method	j	p	0 ~ 3
08. Colour	k	i	0 ~ 64	22. Low Power	j	q	0 ~ 1
09. Tint	k	j	0 ~ 64	23. Orbiter Time Setting	j	r	1 ~ FE
10. Sharpness	k	k	0 ~ 64	24. Orbiter Pixel Setting	j	s	1 ~ 3
11. OSD Select	k	l	0 ~ 1	25. Auto Configure	j	u	1
12. Remote Control lock mode	k	m	0 ~ 1	26. Programme selection	m	a	*
				27. Send IR Code	m	c	Key Code
13. PIP/DW	k	n	*	28. Input select (Main)	x	b	*
14. PIP Position	k	q	0 ~ 3	29. Input select (PIP)	x	y	*

Transmission / Receiving Protocol

Transmission

[Command1][Command2][ ][Set ID][ ][Data][Cr]

[Command 1] : First command to control the set.(j,k,mor x)

[Command 2] : Second command to control the set.

[Set ID] : You can adjust the set ID to choose desired TV ID number in Setup menu. Adjustment range is 1~ 99. When selecting Set ID '0', every connected the TV is controlled. Set ID is indicated as decimal (1~ 99) on menu and as Hexa decimal (0x0~ 0x63) on transmission/receiving protocol.

[DATA] : To transmit command data.
Transmit 'FF' data to read status of comand.

[Cr] : Carriage Return
ASCII code '0x0D'

[ ] : ASCII code 'space (0x20)'

OK Acknowledgement

[Command2][ ][Set ID][ ][OK][Data][x]

The TV transmits ACK (acknowledgement) based on this format when receiving normal data. At this time, if the data is data read mode, it indicates present status data. If the data is data write mode, it returns the data of the PC computer.

Error Acknowledgement

[Command2][ ][Set ID][ ][NG][Data][x]

The TV transmits ACK (acknowledgement) based on this format when receiving abnormal data from non-viable functions or communication errors.

Data1: Illegal Code

Data2: Not supported function

Data3: Wait more time

APPENDIX

01. Power (Command2:a)

To control Power On/Off of the TV.

Transmission [k][a][ ][Set ID][ ][Data][Cr]

Data 0 : Power Off Data 1 : Power On

Acknowledgement [a][ ][Set ID][ ][OK][Data][x]

To show Power On/Off.

Transmission [k][a][ ][Set ID][ ][FF][Cr]

Acknowledgement [a][ ][Set ID][ ][OK][Data][x]

* In a like manner, if other functions transmit 'FF' data based on this format, Acknowledgement data feedback presents status about each function.

02. Aspect Ratio (Command2:c) (Main picture size)

To adjust the screen format. (Main picture format)

You can also adjust the screen format using the ARC (Aspect Ratio Control) button on remote control or in the SCREEN menu.

Transmission [k][c][ ][Set ID][ ][Data][Cr]

Date 1: Normal screen (4:3)
Date 2: Wide screen (16:9)
Date 3: Spectacle
Date 4: Full screen (Zoom1)
Date 5: Full screen (Zoom2)
Date 6: Original
Date 7: Wide screen (14:9)
Date 8: Full (Option)

Acknowledgement [c][ ][Set ID][ ][OK][Data][x]

* Using the PC input, you select either 16:9 or 4:3 screen aspect ratio.

03. Screen Mute (Command2:d)

To select screen mute on/off.

Transmission [k][d][ ][Set ID][ ][Data][Cr]

Data 0 : Screen mute off (Picture on)

Data 1 : Screen mute on (Picture off)

Acknowledgement [d][ ][Set ID][ ][OK][Data][x]

04. Volume Mute (Command2:e)

To control volume mute on/off.

You can also adjust mute using the MUTE button on remote control.

Transmission [k][e][ ][Set ID][ ][Data][Cr]

Data 0 : Volume mute off (Volume on)

Data 1 : Volume mute on (Volume off)

Acknowledgement [e][ ][Set ID][ ][OK][Data][x]

05. Volume Control (Command2:f)

To adjust volume.

You can also adjust volume with the volume buttons on remote control.

Transmission [k][f][ ][Set ID][ ][Data][Cr]

Data Min : 0 ~ Max : 64

Refer to 'Real data mapping 1 '. See page 6

Acknowledgement [f][ ][Set ID][ ][OK][Data][x]

06. Contrast (Command2:g)

To adjust screen contrast.

You can also adjust contrast in the PICTURE menu.

Transmission [k][g][ ][Set ID][ ][Data][Cr]

Data Min : 0 ~ Max : 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [g][ ][Set ID][ ][OK][Data][x]

07. Brightness (Command2:h)

To adjust screen brightness.

You can also adjust brightness in the PICTURE menu.

Transmission [k][h][ ][Set ID][ ][Data][Cr]

Data Min : 0 ~ Max : 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [h][ ][Set ID][ ][OK][Data][x]

08. Colour (Command2:i)

To adjust the screen colour.

You can also adjust colour in the PICTURE menu.

Transmission [k][i][ ][Set ID][ ][Data][Cr]

Data Min : 0 ~ Max : 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [i][ ][Set ID][ ][OK][Data][x]

09. Tint (Command2:j)

To adjust the screen tint.

You can also adjust tint in the PICTURE menu.

Transmission [k][j][ ][Set ID][ ][Data][Cr]

Data Red : 0 ~ Green : 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [j][ ][Set ID][ ][OK][Data][x]

10. Sharpness (Command2:k)

To adjust the screen sharpness.

You can also adjust sharpness in the PICTURE menu.

Transmission [k] [k] [ ] [Set ID] [ ] [Data] [Cr]

Data Min: 0 ~ Max: 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [k] [ ] [Set ID] [ ] [OK] [Data] [x]

11. OSD Select (Command2:l)

To select OSD (On Screen Display) on/off when controlling remotely.

Transmission [k] [l] [ ] [Set ID] [ ] [Data] [Cr]

Data 0: OSD off
Data 1: OSD on

Acknowledgement [l] [ ] [Set ID] [ ] [OK] [Data] [x]

12. Remote Control Lock Mode (Command2:m)

To lock the remote control and the front panel controls on the set.

Transmission [k] [m] [ ] [Set ID] [ ] [Data] [Cr]

Data 0: Lock off Data 1: Lock on

Acknowledgement [m] [ ] [Set ID] [ ] [OK] [Data] [x]

If you're not using the remote control and front panel controls on the TV, use this mode. When main power is on/off, remote control lock is released.

13. PIP / DW (Command2:n)

To control the PIP (Picture In picture)/DW.

You can also control the PIP/DW using the PIP button on the remote control or in the PIP/DW menu.

Transmission [k] [n] [ ] [Set ID] [ ] [Data] [Cr]

Data 0:PIP/DW off Data 1: PIP
Data2: DW1 Data3: DW2
Data5: POP(option)

Acknowledgement [n] [ ] [Set ID] [ ] [OK] [Data] [x]

14. PIP Position (Command2:q)

To select sub picture position for PIP.

You can also adjust the sub picture position using POSI-TION button on the remote control or in the PIP/DW menu.

Transmission [k] [q] [ ] [Set ID] [ ] [Data] [Cr]

Data 0: Right down on screen
Data 1: Left down on screen
Data 2: Left up on screen
Data 3: Right up on screen

Acknowledgement [q] [ ] [Set ID] [ ] [OK] [Data] [x]

15. Balance (Command2:t)

To adjust balance.

You can also adjust balance in the SOUND menu.

Transmission [k] [t] [ ] [Set ID] [ ] [Data] [Cr]

Data Min: 0 ~ Max: 64

Refer to 'Real data mapping 1'. See page 6

Acknowledgement [t] [ ] [Set ID] [ ] [OK] [Data] [x]

16. Color Temperature (Command2:u)

To adjust color temperature.

You can also adjust CSM in the PICTURE menu.

Transmission [k] [u] [ ] [Set ID] [ ] [Data] [Cr]

Data 0: Cool 1: Normal 2: Warm 3: User

Acknowledgement [u] [ ] [Set ID] [ ] [OK] [Data] [x]

17. Red Adjustment (Command2:v)

To adjust red in colour temperature.

Transmission [k] [v] [ ] [Set ID] [ ] [Data] [Cr]

Data Min: 0 ~ Max: 3C(or 50)

Refer to 'Real data mapping 2'. See page 6

Acknowledgement [v] [ ] [Set ID] [ ] [OK] [Data] [x]

18. Green Adjustment (Command2:w)

To adjust red in colour temperature.

Transmission [k] [w] [ ] [Set ID] [ ] [Data] [Cr]

Data Min: 0 ~ Max: 3C(or 50)

Refer to 'Real data mapping 2'. See page 6

Acknowledgement [w] [ ] [Set ID] [ ] [OK] [Data] [x]

19. Blue Adjustment (Command2:$)

To adjust red in colour temperature.

Transmission [k] [$] [ ] [Set ID] [ ] [Data] [Cr]

Data Min: 0 ~ Max: 3C(or 50)

Refer to 'Real data mapping 2'. See page 6

Acknowledgement [$] [ ] [Set ID] [ ] [OK] [Data] [x]

APPENDIX

20. Abnormal State (Command2:z)

To recognize an abnormal state.

This feature is not available for all models.

Transmission [k][z][ ][Set ID][ ][FF][ ][Cr]

Data FF: Read

Acknowledgement [z][ ][Set ID][ ][OK][Data][x]

Data 0: Normal (Power on and signal exist)
Data 1: No signal (Power on)
Data 2: Turn the TV off by remote control
Data 3: Turn the TV off by sleep time function
Data 4: Turn the TV off by RS-232C function
Data 5: 5V down
Data 6: AC down
Data 7: Turn the TV off by Fan Alarm function (option)
Data 8: Turn the TV off by Off time function
Data 9: Turn the TV off by Auto sleep function
Data a: Turn the TV off by AV board detect
* This function is "read only".

21. ISM Method (Command1:j, Command2:p)(Option)

To control the ISM method. You can also adjust ISM Method in SPECIAL menu.

This feature is not available for all models.

Transmission [j][p][ ][Set ID][ ][Data][Cr]

Data 0: Normal Mode Data 1: White Wash
Data2: Orbiter Data3: Inversion

Acknowledgement [p][ ][Set ID][ ][OK][Data][x]

22. Low Power (Command1:j, Command2:q)(Option)

To reduce the power consumption of the monitor. You can also adjust Low Power in SPECIAL menu.

This feature is not available for all models.

Transmission [j][q][ ][Set ID][ ][Data][ ][Cr]

Data 0: Off Data 1: On

Acknowledgement [q][ ][Set ID][ ][OK][Data][x]

23. Orbiter Time Setting (Command1:j, Command2:r)(Option)

To adjust orbiter operation time term.

This feature is not available for all models.

Transmission [j][r][ ][Set ID][ ][Data][ ][Cr]

Data Min: 1 ~ Max: FE

Refer to 'Real data mapping 1'.

Acknowledgement [r][ ][Set ID][ ][OK][Data][x]

24 . Orbiter Pixel Setting (Command1:j, Command2:s)(Option)

To adjust pixel number in orbiter function.

This feature is not available for all models.

Transmission [j][s][ ][Set ID][ ][Data][Cr]

Data Min: 1 ~ Max: 3

Refer to 'Real data mapping 1'.

Acknowledgement [s][ ][Set ID][ ][OK][Data][x]

25 . Auto Configure (Command1:j, Command2:u)

To adjust picture position and minimize image shaking automatically. It works only in RGB (PC) mode.

Transmission [j][u][ ][Set ID][ ][Data][Cr]

Data 1: To set

Acknowledgement [u][ ][Set ID][ ][OK][Data][x]

26 . Programme selection (Command1:m, Command2:a)

To select a programme for the main picture.

Transmission [m][a][ ][Set ID][ ][Data0][ ][Data1][ ][Data2][Cr]

Data 0: Min: 0 ~ Max: 63 (0~C7, 200 Pr is on)

Refer to 'Real data mapping 1'.

Data 1: Don't care

Data 2: 0 : Main
1 : Sub

Acknowledgement [a][ ][Set ID][ ][OK][Data0][x]

*** Real data mapping 1**

0 : Step 0
⋮
A : Step 10 (Set ID 10)
⋮
F : Step 15 (Set ID 15)
10 : Step 16 (Set ID 16)
⋮
64 : Step 100
⋮
6E : Step 110
⋮
73 : Step 115
74 : Step 116
⋮
C7 : Step 199
⋮
FE : Step 254
FF : Step 255

*** Real data mapping 2**

0 : -40
1 : -39
2 : -38
⋮
28 : 0
⋮
4E : +38
4F : +39
50 : +40

27. Send IR Code (Command1:m, Command2:c)

To send IR remote key code.

Transmission [m][c][ ][Set ID][ ][Data][Cr]

Data: Key code - Refer to page 9

Acknowledgement [c][ ][Set ID][ ][OK][Data][x]

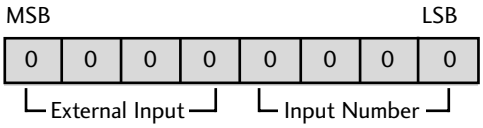
28. Input select (Command1:x, Command2:b)

(Main Picture Input)

To select input source for TV

Transmission [x][b][ ][Set ID][ ][Data][Cr]

Data: Structure



External Input				Data
0	0	0	1	Analog
0	0	1	0	AV
0	0	1	1	S-Video
0	1	0	0	Component
0	1	0	1	RGB-DTV
0	1	1	0	RGB-PC
1	0	0	1	HDMI

Input Number				Data
0	0	0	0	Input1
0	0	0	1	Input2
0	0	1	0	Input3
0	0	1	1	Input4

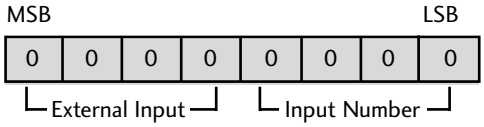
Acknowledgement [b][ ][Set ID][ ][OK][Data][x]

29. Input select (Command1:x, Command2:y)

To adjust input source for sub picture in PIP mode

Transmission [x][y][ ][Set ID][ ][Data][Cr]

Data: Structure



External Input				Data
0	0	0	1	Analog
0	0	1	0	AV
0	0	1	1	S-Video
0	1	0	0	Component
0	1	0	1	RGB-DTV
0	1	1	0	RGB-PC
1	0	0	1	HDMI

Input Number				Data
0	0	0	0	Input1
0	0	0	1	Input2
0	0	1	0	Input3
0	0	1	1	Input4

Acknowledgement [y][ ][Set ID][ ][OK][Data][x]

APPENDIX

IR CODES

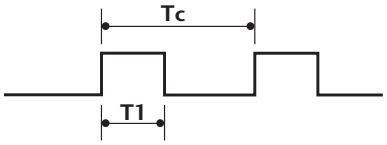
1. How to Connect

■ Connect your wired remote control to the Remote Control port on the TV.

2. Remote Control IR Codes

■ **Output waveform**

Single pulse, modulated with 37.917KHz signal at 455KHz

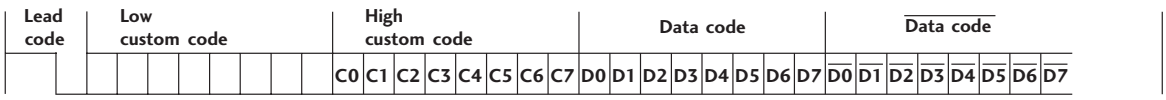


Carrier frequency

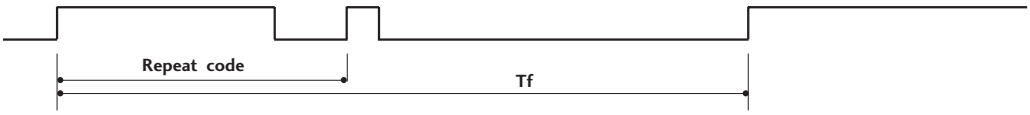
FCAR = 1/TC = fOSC/12
Duty ratio = T1/TC = 1/3

■ **Configuration of frame**

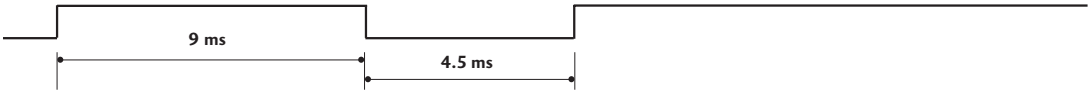
1st frame



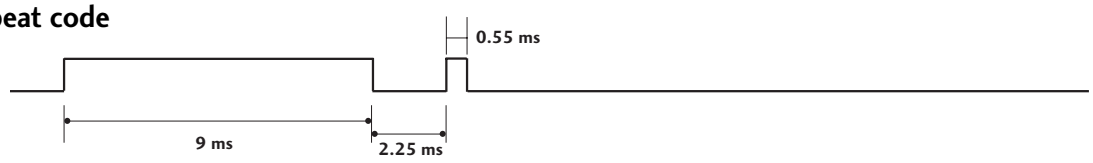
Repeat frame



■ **Lead code**

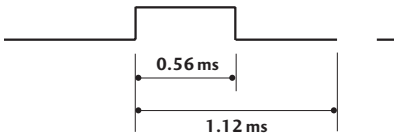


■ **Repeat code**

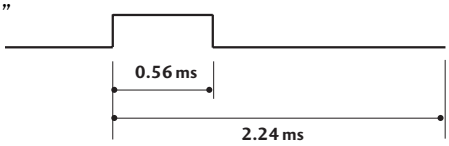


■ **Bit description**

Bit "0"

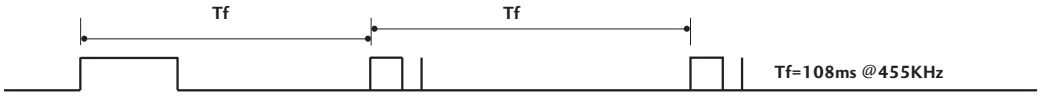


Bit "1"



■ **Frame interval: Tf**

The waveform is transmitted as long as a key is depressed.



REMOTE CONTROL IR CODES

Code (Hexa)	Function	Note	Code (Hexa)	Function	Note
0F	TV	R/C Button	72	RED	R/C Button
0B	INPUT	R/C Button	71	GREEN	R/C Button
08	POWER	R/C Button (Power On/Off)	63	YELLOW	R/C Button
C4	POWER ON	Discrete IR Code (Only Power On)	61	BLUE	R/C Button
C5	POWER OFF	Discrete IR Code (Only Power OFF)	02	VOL +	R/C Button
60	PIP	R/C Button	03	VOL -	R/C Button
0E	SLEEP	R/C Button	00	PR +	R/C Button
20	TEXT	R/C Button	01	PR -	R/C Button
0A	I/II	R/C Button	09	MUTE	R/C Button
43	MENU	R/C Button	53	LIST	R/C Button
79	ARC	R/C Button	10 ~ 19	Number Key 0 ~ 9	R/C Button
5B	EXIT	R/C Button	1E	FAVOURITE	R/C Button
07	◄	R/C Button	1A	Q.VIEW	R/C Button
06	►	R/C Button	64	SIZE	R/C Button
40	▲	R/C Button	62	PIP: POSITION,	R/C Button
41	▼	R/C Button		Teletext: UPDATE	R/C Button
44	OK	R/C Button	70	INDEX	R/C Button
72	PIP PR-	R/C Button	26	TIME	R/C Button
71	PIP PR+	R/C Button	2A	REVEAL	R/C Button
63	SWAP	R/C Button	E0	🔆 +	R/C Button
61	PIP INPUT	R/C Button	E1	🔆 -	R/C Button